

5'UTR and all of the 3'UTR were contained within a single exon located within H4 at positions 98457-99968 (commencing 50.5 kb downstream from the start of the GST-4 $\alpha$  ORF). The GST-4 $\beta$  5'UTR was again contained in at least two small exons located upstream of the GST-4 $\beta$  ORF but downstream of the GST-4 $\alpha$  ORF. Thus 4b\_5U1 (bases 100 - 171 in GST-4 $\beta$  cDNA, sequence 3) corresponds to bases 96413-96484 in the contig. And 4b\_5U2 (bases 9 - 99 in GST-4 $\beta$  cDNA) corresponds to bases 83257-83347 in the contig. 5' regulatory sequences controlling the transcription of GST-4 $\beta$  gene in the cell (GST-4 promoter) may be located somewhere upstream of 4b\_5U2 but downstream of the GST-4 $\alpha$  ORF and/or transcription of GST-4 $\alpha$  and - $\beta$  may be controlled by common regulatory sequences. Thus, as shown schematically in Figure 7, the H4 gene is actually a tandem repeat of two highly similar *GST* genes *GST4 $\alpha$*  and *GST4 $\beta$* . The enzyme encoded by *GST4 $\alpha$*  has been shown experimentally to catalyze 6-O-sulfation at GlcNAc in mucin-type acceptor glycoproteins (GlyCAM-1). GST-4 $\beta$  is 85.6 % identical to GST-4 $\alpha$  on the amino acid level.

#### IN THE CLAIMS

Please enter the amendments to claims 5-9 and 12, as shown below.

Please enter new claims 30-57, as shown below.

~~Sub B1~~ 5. (Amended) A nucleic acid present in other than its natural environment, wherein said nucleic acid comprises a nucleotide sequence encoding a glycosyl sulfotransferase-4 $\alpha$  (GST-4 $\alpha$ ) polypeptide, wherein said GST-4 $\alpha$  polypeptide comprises an amino acid sequence that is at least 85% identical to the amino acid sequence set forth in SEQ ID NO:08.

6. (Amended) A nucleic acid according to Claim 5, wherein said nucleic acid comprises a nucleic acid sequence that is substantially identical to or the same as the nucleotide sequence of SEQ ID NOS: 01, 02, 03, 04, 10, or 11.

7. (Amended) A fragment of the nucleic acid according to Claim 5, wherein said fragment catalyzes the transfer of a sulfate group from a donor to a selectin ligand.

8. (Amended) An isolated nucleic acid that hybridizes at 50°C or higher in a solution of 15 mM NaCl and 1.5 mM sodium citrate to the nucleic acid according to Claim 6 or a complementary

sequence thereof, wherein said nucleic acid encodes a glycosyl sulfotransferase.

9. (Amended) An expression cassette comprising a transcriptional initiation region functional in an expression host, a nucleic acid comprising a nucleotide sequence found in the nucleic acid according to Claim 5 or claim 7 under the transcriptional regulation of said transcriptional initiation region, and a transcriptional termination region functional in said expression host.

12. (Amended) A method of producing a glycosyl sulfotransferase, said method comprising: growing a cell according to Claim 10, whereby said glycosyl sulfotransferase is expressed; and isolating said glycosyl sulfotransferase substantially free of other proteins.

-- 30. (New) A nucleic acid present in other than its natural environment, wherein said nucleic acid comprises a nucleotide sequence encoding a glycosyl sulfotransferase-4 $\beta$  (GST-4 $\beta$ ) polypeptide, wherein said GST-4 $\beta$  polypeptide comprises an amino acid sequence having at least 85% amino acid sequence identity to the amino acid sequence set forth in SEQ ID NO:13.

31. (New) A nucleic acid according to claim 30, wherein said nucleic acid comprises a nucleic acid sequence that is substantially identical to or the same as the nucleotide sequence set forth in SEQ ID NOS:11, 12, or 21.

32. (New) A nucleic acid according to claim 30, wherein said polypeptide comprises an amino acid sequence that is substantially identical to or the same as the amino acid sequence set forth in SEQ ID NO:13.

33. (New) A fragment of the nucleic acid according to claim 30, wherein said fragment catalyzes the transfer of a sulfate group from a donor to a selectin ligand.

34. (New) An isolated nucleic acid that hybridizes at 50°C or higher in a solution of 15 mM NaCl and 1.5 mM sodium citrate to the nucleic acid according to claim 31 or a complementary sequence thereof, wherein said nucleic acid encodes a glycosyl sulfotransferase.

35. (New) An expression cassette comprising a transcriptional initiation region functional in an expression host, a nucleic acid comprising the nucleic acid according to claim 30 or claim 33 under the transcriptional regulation of said transcriptional initiation region, and a transcriptional termination region functional in said expression host.

36. (New) A cell comprising an expression cassette according to claim 35 as part of an extrachromosomal element or integrated into the genome of a host cell as a result of introduction of said expression cassette into said host cell.

37. (New) The cellular progeny of the host cell according to claim 36.

38. (New) A method of producing a glycosyl sulfotransferase, said method comprising:  
growing a cell according to claim 36, whereby said glycosyl sulfotransferase is expressed; and  
isolating said glycosyl sulfotransferase substantially free of other proteins.

39. (New) A nucleic acid present in other than its natural environment, wherein said nucleic acid comprises a nucleotide sequence encoding a glycosyl sulfotransferase-6 (GST-6) polypeptide, wherein said GST-6 polypeptide comprises an amino acid sequence that has at least 85% amino acid sequence identity to the amino acid sequence set forth in SEQ ID NO:15.

40. (New) A nucleic acid according to claim 39, wherein said nucleic acid comprises a nucleic acid sequence that is substantially identical to or the same as the nucleotide sequence of SEQ ID NOS:14, 16, 18, 19, 20, 22, or 23.

41. (New) A nucleic acid according to claim 39, wherein said polypeptide comprises an amino acid sequence that is substantially identical to or the same as the amino acid sequence set forth in SEQ ID NO:15.

42. (New) A fragment of the nucleic acid according to claim 39, wherein said fragment catalyzes the transfer of a sulfate group from a donor to a selectin ligand.

43. (New) The fragment according to claim 42, wherein said fragment encodes amino acids 851 to 1222 of SEQ ID NO:15.

44. (New) An isolated nucleic acid that hybridizes at 50°C or higher in a solution of 15 mM NaCl and 1.5 mM sodium citrate to a nucleic acid of SEQ ID NO:22 or a complementary sequence of SEQ ID NO:22, wherein said nucleic acid encodes a glycosyl sulfotransferase.

45. (New) An expression cassette comprising a transcriptional initiation region functional in an expression host, a nucleic acid comprising the nucleic acid according to claim 39 or claim 42 under the transcriptional regulation of said transcriptional initiation region, and a transcriptional termination region functional in said expression host.

46. (New) A cell comprising an expression cassette according to claim 45 as part of an extrachromosomal element or integrated into the genome of a host cell as a result of introduction of said expression cassette into said host cell.

47. (New) The cellular progeny of the host cell according to claim 46.

48. (New) A method of producing a glycosyl sulfotransferase, said method comprising:  
growing a cell according to claim 46, whereby said glycosyl sulfotransferase is expressed; and  
isolating said glycosyl sulfotransferase substantially free of other proteins.

49. (New) An isolated nucleic that hybridizes at 50°C or higher in a solution of 15 mM NaCl and 1.5 mM sodium citrate to the nucleic acid according to claim 6 or a complementary sequence thereof, wherein said nucleic acid detects GST-4 $\alpha$  polynucleotides.

50. (New) The isolated nucleic acid of claim 49, wherein said nucleic acid is from about 20 to about 1000 nucleotides in length.

51. (New) An isolated nucleic acid that hybridizes at 50°C or higher in a solution of 15 mM NaCl and 1.5 mM sodium citrate to the nucleic acid according to claim 31 or a complementary sequence thereof, wherein said nucleic acid detects GST-4β polynucleotides.

52. (New) The isolated nucleic acid of claim 51, wherein said nucleic acid is from about 20 to about 1000 nucleotides in length.

53. (New) An isolated nucleic acid that hybridizes at 50°C or higher in a solution of 15 mM NaCl and 1.5 mM sodium citrate to the nucleic acid according to claim 40 or a complementary sequence thereof.

54. (New) The isolated nucleic acid of claim 53, wherein said nucleic acid is from about 20 to about 3500 nucleotides in length.

d. 55. (New) The nucleic acid of claim 5, wherein said nucleic acid encodes a GST-4α polypeptide comprising an amino acid sequence that is at least 90% identical to SEQ ID NO:08.

56. (New) The nucleic acid of claim 30, wherein said nucleic acid encodes a GST-4β polypeptide comprising an amino acid sequence that is at least 90% identical to SEQ ID NO:13.

57. (New) The nucleic acid of claim 39, wherein said nucleic acid encodes a GST-6 polypeptide comprising an amino acid sequence that is at least 90% identical to SEQ ID NO:15.--

add B1